Simulation games for collaborative development in e-Government

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Abstract

Governments aim to improve service delivery to citizens and businesses and need to transform to accomplish efficiency savings and better customer orientation. This requires the coordination of dependencies among the various departments located in the frontend and backend of organizations, and might include interdependencies with external parties. Transforming this fragmented landscape requires an understanding of issues at play, and the collaborative development of possible solutions. Every stakeholder has its own perspective, background, knowledge, and interests, and with their own situation and issues in mind, they often fail to grasp the bigger picture.

Simulation games refer to a situation in which human participants play a role and follow certain rules to simulate a complex real-world phenomenon. Such a game can enhance participant's understanding of the complexities involved in the big picture, which might facilitate improvement. In this paper we present and evaluate a simulation game for public service delivery. The game facilitates problem-oriented learning and collaborative improvement of public service delivery. We measured participant views on the success of the collaboration in multiple sessions, using observations and a survey. The analyses show that participants find the process of the game successful and are willing to commit resources to it.

1. Introduction

The public sector has great expectations of using the internet as a new channel to provide better services to citizens and businesses, at lower costs [1]. Integrated service delivery employs various service delivery channels (telephone, service desk, internet) and has to deal with a fragmentation of information, processes, tasks and responsibilities. To integrate service delivery, various departments need to cooperate to ensure that an integrated response is created. Different departments use different systems, have different information, and provide various services through multiple channels. Therefore, the arrangement of the back offices, departments, and the allocation of roles and responsibilities influences the configuration the service delivery. This is primarily due to the siloed organizational structure that is typical for many government organizations. Improving service delivery is a complex endeavor. Many electronic government (e-government) efforts take place in a complex environment of services, systems, processes, channels, and organizational structure, with fragmented responsibilities and information.

Theoretically, many service delivery forms are possible when offering services to citizens and businesses [2]. It is conceivable that one single organization offers an integrated package with a set of channels, combination of services and the exchange of data, but also that multiple organizations cooperate and retain their autonomy. This is especially important when private parties are included in the network, for example in public-private partnerships [3, 4]. The wide variety of options and the large number of stakeholders complicates the development process.

Each of the departments or organizations involved in service delivery has its own business processes, information, systems and infrastructure. For each of the stakeholders involved, any other actors' processes and systems are often a black-box. Their main concern is operating and improving their own processes. When striving for integrated service delivery, the services and information fragmented over the actors should be in sync. However, in the complex structure of functional silo's, the responsibilities for the services and the information administered are often scattered throughout the organization. Managing the dependencies among the functional silo's, the services, and the information is one of the key challenges that government organizations face today. These dependencies need to be coordinated to achieve a collective result [5].

As often no single actor has a complete overview of all the dependencies that exist, it is very difficult for all actors involved to come to a joint analysis of the problem and to a shared mindset on the transformation that is required to manage these dependencies in order to improve service delivery. This requires the

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involvement of – among others – decision-makers, managers and administrative staff involved in service delivery. It is a change process that requires strong communication, coordination, and cooperation between various departments and layers of an organization [6, 7]. To enhance participation in the identification of problems and the collaborative design of innovative integrated-service delivery solutions, a simulation game can be a useful instrument [8, 9]. A simulation game mimics a real-world situation in which participants are allocated roles and play a game in a specific situation, guided by rules. For education purposes, gaming simulation has proven to be able to provide an interactive environment to facilitate problem-oriented learning, and to thereby support change processes [10].

The development of integrated public sector service delivery is such a complex change process as there are many stakeholders and complexities involved, including the fragmented nature and many alternative development directions that can be taken. We developed a simulation game as an instrument to facilitate this development by facilitating problem-oriented learning. As the core problems for many government organizations include the fragmented organizational structure and responsibilities, the game provides a setting that enables actors to gain insights in the service delivery issue as a whole, and thus support them in transcending their own fragmented boundaries. Starting with a shared understanding of the problem, the setting allows game participants to collaborate in the development of solutions.

To assess whether the simulation game is in fact a valuable instrument to invoke the collaborative development of service delivery, we conducted a survey (based on a survey developed for collaboration engineering, extensively described in [11]) among the participants of various sessions. Furthermore, we evaluate the usefulness of the game in the development- and transformation process which is the focus of this paper.

The paper is structured as follows; first we describe the theoretical underpinnings of simulation gaming and collaboration. Next, we briefly describe the simulation game and underlying concepts. Then, we describe the results from the survey and evaluate whether a simulation game is a valuable tool in the process of developing services and in providing the insights and commitment of participants to the transformation of government. Finally, we discuss the potential of simulation games and other tools as development methods for electronic government, and draw conclusions.

2. Theoretical background

Integrated service delivery has dependencies that stretch from the front office channels that citizens and business contact, to the back offices of organizations that perform the tasks and processes required to provide an answer or result to the client's question or request. The information and systems are often fragmented and organizations are often also dependent on other organizations, for example to execute certain processes or to provide information that is needed by a certain department or service channel.

The dependencies therefore resemble a network structure, which implies a multitude of interdependent departments and organizations [12-15]. Networks are characterized by variety and interdependence of actors. This situation is often incompatible with the hierarchical structures that government organizations are organized in. This also impacts the strategies that organizations can employ to improve service delivery.

When looking at the dependencies in the design and operations of public service delivery, the network approach illustrates that public service delivery needs to be a joint effort of the entire network. The configuration of the networks varies from case to case as each (public) organization the network may consist of a number of channels, a front office department (e.g. a service center) and a number of departments in the back office. Another organization might be heavily dependent on third parties, for example to provide or process information. In that case, the network also includes parties outside the organization's own boundaries.

All those actors have their own tasks, perspectives, and interests. Furthermore, they often do not know or understand how their actions influence the options and actions of other actors. Organizational and functional boundaries can distribute knowledge of all value-added activities in such a way that no single actor, including management, has complete knowledge of the processes that are involved [16]. As service delivery is often a joint effort of an entire organization (or an entire network), improving the service delivery requires change management. Even in the hierarchical organization of many government agencies, treating the actors as subordinates fails to respect the dependencies that exist in service delivery. Since it is a joint effort, the quality of the outcome depends heavily on the knowledge and relations of the other actors involved [15, 17, 18]. The efforts to improve service delivery thus also have to facilitate acceptance and commitment to the situation. Following a network approach, in such projects it is required to analyze the situation and interests of all relevant actors, and involve them in the process. An hierarchical approach

– which treats other actors as controllable objects – leads to serious problems in the implementation [19].

The process of improving service delivery requires actors to gain insight in the dependencies, and to overcome hurdles at the information level (e.g. different data definitions and terminology), the individual level (e.g. resistance to change), the organizational level (e.g. lack of understanding among actors, and conflicting priorities), and the political and legal level (e.g. lack of support) [20, 21]. These hurdles require a collaborative perspective on public service delivery projects, since – as we have argued before – an hierarchical approach does not always work. Gil-Garcia, Chengalur-Smith and Duchessi [20] find that a more participatory approach is required.

The core problem we are working with is that the transformation – in the complex setting with the many dependencies that we described – of public service delivery requires cooperation. To enable this cooperation, we want to involve relevant actors to participate in problem identification and –solving, in order to enable them to collaboratively transform the current situation to enable improved service delivery.

2.1. Enhancing participation with gaming

To overcome the issue that fragmentation poses on the improvement of service delivery, the actors involved need to recognize that service delivery is a joint effort and that a collaborative mindset is required of all. Actors need to transcend their own realm and each bring in their knowledge and expertise to come to a collective result. The actors need to gain a mutual understanding of each other's roles and the issues that are at play. As in many public sector projects, (multi-organizational) service delivery requires information sharing, and not just in a technical sense. Information sharing can lead to better decision making processes, enhanced networks, better control and coordination, improved services, and reduced costs [20].

Since collaborative efforts are joint, rather than individual [22], we developed a simulation game for improving service delivery by focusing on participation of various actors to foster a collaborative change process.

Games can be used as an instrument to facilitate the collaboration between actors by enabling them to develop a joint perspective and approach to a shared issue. Such games can also accommodate both quantitative and qualitative research methods to measure the use and success of the game as a process and a developed artifact (e.g. agreements, process, organizational arrangements, etc.) as a result [23]. In a game, "human participants play a role in an artificial setting that models (an aspect of) reality" [24] (p.23).

To ensure that the results (both for the participants and for the researchers) of a game have real world validity, the game design must simulate the core characteristics of the real world situation [24, 25]. Therefore, we use the term 'simulation game'. The system we use in the game needs to capture the essence of the complexity of multiple actors, roles, responsibilities, information, processes, and the fragmentation thereof. In the game, the participants are allocated certain roles and play this role during the game, which is guided by game rules and interventions. Since it is necessary to let actors think outside-their-own-box, actors play a role in the game that is different from their daily role in the organization. To maintain manageability and understandability of the roles and the game as a whole, the game design must reduce the real-world's complexity, but in such a way that essential detail are not omitted [26]. The game design requires that the "the roles, rules and incentives of the game mimic some real-world phenomenon" [27]. We discuss the design of the service delivery game extensively in [23].

As a solution to the problem introduced in the previous paragraph, we thus propose that the simulation game is meaningful instrument to playfully introduce relevant actors to this problem and have them participate in the problem solving. Thereby, the collaboration needed to transform public services is enhanced. The game aims to improve the cooperation between the various actors that play a role in multichannel service delivery by facilitating mutual understanding and a collaborative development process. To test whether the game succeeds at this, we conducted a survey measuring whether the tool does in fact contribute to collaboration.

2.2. Measuring collaboration

We used a slightly adapted version of an instrument designed to measure the success of collaboration, as described in [11]. Following [22] collaboration is defined as a "joint effort towards a group goal" [11]. Subsequently, the authors define successfulness of collaboration as "the appreciation of joint effort and its outcome by relevant stakeholders" [11] and measure success both for the outcomes and the process itself.

The instrument itself is a questionnaire containing six constructs measuring the participants' perception on success of the collaborative effort: efficiency, effectiveness, productivity, commitment of resources, satisfaction with the results, and satisfaction with the process [11]. The questionnaire we used is in Dutch and we replaced the productivity construct with questions measuring the commitment to the outcome of a session. We used this questionnaire to assess the

success of the service delivery game as a method to collaboratively work on the service delivery issue by a group of actors. The questionnaire with all thirty questions and the overarching constructs can be found in appendix A.

3. The simulation game

3.1. Goals and background

The aim of service delivery game is to allow stakeholders to understand service delivery issues and identify solutions for improvement. The game focuses on the organizational aspect and the links with the technology that is required to facilitate public service delivery, as well as stressing the requirement that public organizations need to improve their understanding of client behavior. As we illustrated in the theoretical background, public service delivery is a joint effort by an entire network (of departments, or even organizations). As a technical bottom-up or an authoritative top-down approach does not suffice, the simulation game plays a vital part in the change process and –management of developing and adopting transformed public service delivery.

We position the simulation game as an instrument that facilitates the transformation of public service delivery in order to enhance its added value. It should further facilitate the developing integrated service delivery in organizations. Requirements on the game are that it should provide an easily accessible way to introduce people to an issue and to involve them in solving it. It aims to establish a collaborative mindset among participants and to induce understanding of and support for problem solving.

3.2. Developing the game

Games are an abstraction of reality and should capture the main complexities that need to be addressed when developing e-government. The game needs to be a realistic reflection of a real-world situation. Therefore, the game was designed based on explorative research in over ten cases, capturing a variety of public service delivery situations. Typical service delivery processes and –issues were abstracted from these cases and used to design the generic game concept. Typically issues included the lack of integration of systems, not having the right information, outdated information, unclear responsibilities, no tracking and tracing of statuses, and no mechanism for continuous improvement. For individual sessions, this generic design is translated to a specific situation that is identifiable for the participants of that session. Since this is an abstraction, real-life implications need to be actively sought after. This is done in the evaluation of a game session by translating the lessons back to a specific case. This is schematically illustrated in figure 1.

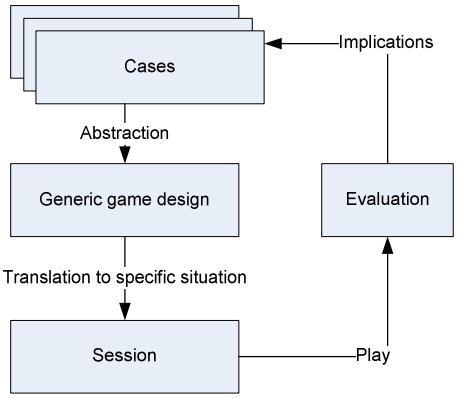

Figure 1: use of cases

In the service delivery game, three service channels are included, namely: the electronic channel, the telephone channel and a service desk. Through these channels, the organization delivers a few services, including information services and transaction features. Most channels are available for all services, but there is some variation. For example, a client can request information (e.g. status) at the telephone channel, but needs to use the website or go to the front desk to change information (e.g. personal information). A front office manager, who is responsible for all client contact, manages the channels. The back office handles changes in information and processes information from third parties (e.g. a municipality that provides address information). A back office manager is responsible for these processes and the systems and information that are affected by it. It is a system of people, so every bit of information is represented by paper and all roles are played by participants (including the online channel). This stresses the interdependencies that exist between people, roles, information, departments and organizations, without the burden of a specific (limited) information system.

3.3. Session design

A typical session has an average of 20 participants, distributed over seven playing-roles: clients (citizens), employees for all three channels, managers of the front- and back office, and back office employees. Depending on the number of participants, the number of people playing the same role varies. However, there are always more people playing a client then that there are people playing a service channel. In that way, some

pressure is created, which gets the game going. In total there are a hundred tasks (e.g. questions and requests) that the people that play a client can fire at the service channels. The types of issues, questions and requests are customizable to improve realism for the participants of a specific session. The generic structure of the game is illustrated in figure 2.

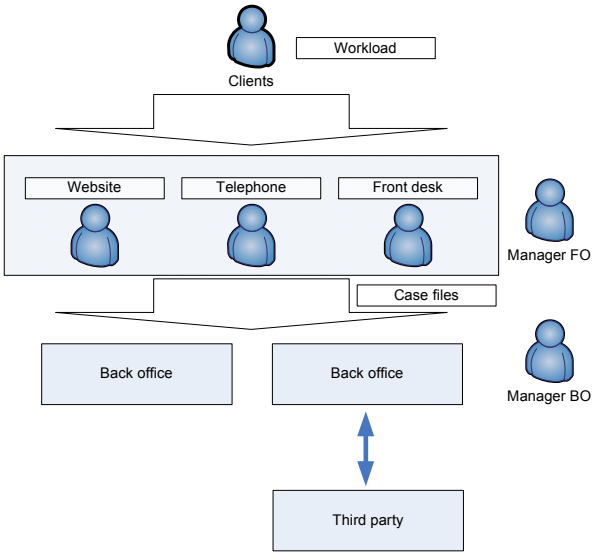

Figure 2: overall structure of the game

After an introduction, we start with a first round of playing the game, followed by a plenary session. That session is used to reflect on the issues that have arisen during the game. The participants are then encouraged to collaboratively come up with a solution to improve the situation. Since the simulation game is one of human interactions, the processes and organizational arrangements can be adapted. The adapted situation is then played in a second round, followed by another evaluation and reflection phase in which the facilitator requests the participants to make the translation to their own situation and organization. In this way, the lessons are not only applied to the game that illustrates the issues, but are also translated and applied to the actual organization. The phases of the game are presented in figure 3. Albeit this figure is theoretically indefinite, all sessions we conducted consisted of one improvement cycle (thus, two rounds of play with subsequent evaluation).

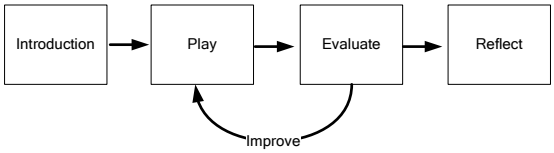

Figure 3: phases of the game

The empirical results that are presented in the next section are based on four sessions of the game, including two with large government executive organizations, one with a medium-sized municipality and one with representatives of over eight different organizations, all in the Netherlands. The participants include both business and IT people, from various levels in the organization.

4. Findings

The questionnaire – taken after each session of the simulation game – includes six factors distributed over 30 questions. The questionnaire can be found in appendix A (translated from Dutch). Each construct was measured with multiple questions on a Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). The original questionnaire was validated using – among others – exploratory factor analysis and Cronbach's alpha [11]. Since we adapted the questionnaire by including measurements of commitment to the outcome, we performed an additional factor analysis on our dataset with varimax rotation and performed reliability analysis (Cronbach's alpha) on the factors identified in the exploratory factor analysis.

In the factor analysis we found five factors (we excluded factor loadings under .40). The following factors were identified:

- Satisfaction with the outcome;
- Commitment to the outcome;
- Effectiveness (and satisfaction with process);
- Commitment of resources;
- Efficiency.

The initial six constructs were efficiency, effectiveness, commitment to the outcome, commitment of resources, satisfaction with the results, and satisfaction with the process. After the analysis we find that the questions on the construct 'effectiveness' and 'satisfaction with process' – not surprisingly – actually measure the same thing. We also found a factor we label 'productivity', but dropped this factor since only two items loaded on that factor. Furthermore, the reliability analysis resulted in Cronbach's alpha of .6, whereas all other factors scored higher on reliability ($\alpha > .8$). For the five scales, we analyze the outcome and its implications for the successfulness of our simulation game. One last thing that stands out from the factor analysis is the questions we intended to measure 'commitment to the outcome all loaded on the corresponding factor. Table 1 shows the statistics per scale.

Table 1: scale statistics

Scale	α	Mean	Std. deviation	Mean/ N_items
Satisfaction outcome	.94	37,59	6,71	**4,7**
Commitment to outcome	.92	24,55	4,04	**4,9**
Effectiveness (satisfaction process)	.87	36,65	4,72	**5,2**
Commitment of resources	.88	27,34	4,57	**5,5**
Efficiency	.94	17,60	2,56	**5,9**

The table includes – for the five factors – the reliability (α), the accumulated means of all items per factor, the standard deviation for this mean, and the mean divided by the number of items per factor (mean / N_items). This last column was included to translate the scale statistics back to the Likert scale we used (1 (strongly disagree) to 7 (strongly agree)). This figure thus tells the average score on the Likert scale for each factor, which scores ranges from 4.7 to 5.9; thus from 'slightly agree' to 'agree'. The standard deviation (of the total mean) is quite small; its figure is included to illustrate this.

On average, the participants agreed with the statements in the questionnaire. The results also indicate that the participants are most satisfied with the *efficiency* (e.g. input was justified) and are willing to *commit resources* (e.g. time) to the simulation game. Also, the satisfaction with the process (*effectiveness*) score over 5. These three factors all relate to the collaborative process that the respondents participated in: the service delivery game. The game therefore is regarded (by the participants) successful as a process for collaboration.

The two factors that are related with the outcome score slightly lower, with the *satisfaction with the outcome* at 4.7 (4 is 'neutral') and the willingness to *commit to the outcome* a bit higher at 4.9. To complement this data and to better understand this outcome, we also analyzed the reflection phase of each session qualitatively, which was recorded. Furthermore, a number of open questions were included in the survey, asking the participants what they thought of the process that was followed in the game, of the facilitation, and of the results that were achieved.

Analyzing this qualitative data, we find that participants find the discussion and reflection phase (after playing the game) very important for the translation between the – quite generic – game and the actual situation of an organization. Without putting the results in the context of the issues that practitioners face, the game results in generic lessons on public service delivery, but participants say they expect to learn what concrete steps to take next. To offer this, the reflection face is required, as this adds value for the participants and for the researcher as well. As the statistics show (by the lower scores on 'outcome' scales), the game itself might be too general to provide the added value expected by participants – who have their own perspective foremost in mind. However, most participants stress that playing the game is necessary to facilitate the discussion phase and to invoke the reflection and evaluation of the current situation of the organization.

This result was confirmed in a session with participants from a wide variety of organizations. This session scored equally high on the successfulness of the collaborative process, but lower with regard to the satisfaction with the outcome. From the qualitative data we learn that the participants of this particular session had difficulties to collaboratively translate the in-game findings to actual organizational issues, since that they come from very different organizations. Still, most participants agreed that the reflection phase accompanying the game created the added value that they sought in this participative method.

5. Discussion

5.1. Gaming a collaboration tool

Public service deliver is a typical situation in which a network of relatively autonomous actors has to cooperate to achieve a joint result. A simulation game can be used to establish a mindset of collaboration, and provide insights in the broader problem and into the dependencies that exist.

Based on our experiences with the service delivery game, we found that facilitating collaboration among actors and stakeholders by the use of a simulation game (and perhaps other participative or illustrative tools) is a useful method to achieve progress in the development of (electronic) government. In the game we found that people become enthusiastic and start discussing their next step based on the experiences just gained in the game. The game helps participants to create an overview of the problem area, that individual people and departments may fail to see. Simulation gaming – as a participative development method – helps to overcome the narrow mindset that individual actors have in favor of a joint analysis of the problem and a collective effort to achieve results.

Furthermore, in [28] it is argued that – if the progress of e-government is seen in the form of stages – organizations must develop capabilities to enable the

transition to a next stage. A number of these capabilities relate to stakeholders, collaboration, and transformation. A simulation game can assist in developing and achieving these capabilities and thereby play a part in e-government development processes.

5.2. Gaming as an instrument

A game allows participants to focus on the core of the issues, involving all layers of the organization, and including their various concerns and knowledge to create a shared view on the problems, enables the discussion of possible solutions, and in this way helps to progress e-government development. To investigate whether such a collaborative development method actually brings organizations to a next stage, longitudinal research is required. Furthermore, we conducted the research in sessions with organizations that have a hierarchical – sometimes even siloed – structure. Using the same instrument for process-oriented organizations may require a different translation from the generic game design to a specific session to accommodate the real-world situation.

A simulation game provides a neutral environment (or discussion object) for evaluating hypothetical solutions. This helps to understand the problem and its dependencies better. The use of simulation games (and other tools) as a research and development instrument in e-government can be very valuable. Still, hard evidence is limited. The results of our analysis show its potential. Nevertheless, since it is a time-consuming method for participants, developers, and facilitators, and its impact on the actual decision-making is still unclear, further research is needed on the added value that these participative development methods can offer to practitioners.

5.3. Gaming to transform e-government

Of course, the next step in developing integrated service delivery and the transformation of public organizations needs to taken by decision-makers and other people in the organization. The game does not by itself lead to transformed situation, but it may assist in illustrating necessary changes. Furthermore, it can be used as an instrument to bring various stakeholders together in a cooperative environment, in which the session can function as a relatively neutral object for discussing steps that need to be taken by reality, as well as the tradeoffs and coordination arrangements that are required to improve service delivery.

The game can thus be used as a tool (among others) to offer real value added to the e-government promise.

6. Conclusions and further research

In this paper we developed a simulation game as a participative development method to progress service delivery in e-government. We evaluated the participant's perception of the success of the service delivery game as a collaborative effort and found that most participants found the game a valuable tool, useful to gain insight and oversight in the problems surrounding the development of public service provisioning.

The analyses of the quantitative data (i.e. the survey) show that participants judge the game successful as a collaborative process, and are willing to commit resources to it. Satisfaction with, and commitment to, the outcome is lower, but still rated positive. The qualitative analysis shows that a reflection phase is necessary to translate the outcome of the game to results that an organization or network can use in practice. Overall, the results show that the game can be improved to offer more added value, but already is seen as a successful instrument to facilitate collaboration.

We found that the simulation game contributed to and enhanced the collaboration between various actors that play a role in developing the organizational, process and technical components of e-government, in this case of public service delivery. Apart from the insight into the problems, the 'fun' factor contributed to bringing stakeholders together who were not used to collaborate together in an informal setting.

We recommend further research into instruments that may play a role by introducing participative and collaborative elements in the development of e-government. Also, longitudinal research into the effects on the progress of e-government is required. In our research the next step is to expand the simulation game to include potential private parties. Furthermore, we will develop both quantitative and qualitative instruments that measure the organizational and coordination arrangements that participants develop during a game. This research aims to facilitate the process of transforming government by use of participative development instruments.

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University of Technology. The project aims to find solutions for the multi-channel management problems of governmental organizations. In particular the project addresses channel synchronization and channel control.

7. References

[1] A. Van Deursen and W. Pieterson, "The Internet as a service channel in the Public Sector," in *ICA Conference* Dresden, Germany, 2006.

[2] Cabinet Office, "Channels for Electronic Service Delivery: an Outline of the Policy," in *Framework Policies*. vol. 2008 UK: Cabinet Office, 2003.

[3] P. V. Rosenau, "Introduction. The Strengths and Weaknesses of Public-Private Policy Partnerships," *American Behavioral Scientist,* vol. 43, pp. 10-34, 1999.

[4] N. Pongsiri, "Public-Private Partnerships in Thailand: A Case Study of the Electric Utility Industry," *Public Policy and Administration,* vol. 18, p. 69, 2003.

[5] T. W. Malone and K. Crowston, "The interdisciplinary study of coordination," *ACM Computing Surveys (CSUR),* vol. 26, pp. 87-119, 1994.

[6] S. Liu and J. D. Hwang, "Challenges to Transforming IT in the US Government," *IT Professional,* vol. 5, 2003.

[7] F. J. Carter, T. Jambulingam, V. K. Gupta, and N. Melone, "Technological innovations: a framework for communicating diffusion effects," *Information & Management,* vol. 38, pp. 277-287, 2001.

[8] I. Mayer and W. Veeneman, *Games in a World of Infrastructures: Simulation-games for Research, Learning and Intervention*. Delft: Eburon, 2002.

[9] C. S. Greenblat, *Designing games and simulations*: Sage Publications, 1988.

[10] W. C. Kriz, "Creating effective learning environments and learning organizations through gaming simulation design," *Simulation & Gaming,* vol. 34, pp. 495-511, 2003.

[11] G. P. J. Duivenvoorde, G. L. Kolfschoten, R. O. Briggs, and G. J. De Vreede, "Towards an Instrument to Measure Successfulness of Collaborative Effort from a Participant Perspective," in *42nd Hawaii International Conference on System Sciences (HICSS)* Hawaii, 2009.

[12] D. Chisholm, *Coordination without Hierarchy*. Berkeley: University of California Press, 1989.

[13] W. Powell, "Neither Market nor Hierarchy: Network Forms of Organization," in *Research in Organizational Behavior*, B. M. Staw and L. L. Cummings, Eds. Greenwich CT: JAI Press, 1990.

[14] P. Kenis and V. Schneider, "Policy networks and policy analysis: Scrutinizing a new analytical toolbox," in *Policy networks: Empirical evidence and theoretical considerations*, B. Marin and R. Mayntz, Eds. Frankfurt am Main: Campus Verlag, 1991, pp. 25-59.

[15] J. A. De Bruijn and E. F. Ten Heuvelhof, *Networks and Decision Making*. Utrecht: Lemma, 2000.

[16] S. E. Fawcett, "Using Strategic Assessment to Increase the Value-added Capabilities of Manufacturing and Logistics," *Production and Inventory Management Journal,* pp. 33-37, 1995.

[17] D. R. Hofstadter, "Computer Tournaments of the Prisoner's Dilemma Suggest How Cooperation Evolve," *Scientfic American,* vol. 248, pp. 14-23, 1983.

[18] R. Axelrod, *Evolution of Cooperation*. New York: Basic Books, 1984.

[19] J. A. De Bruijn and E. F. Ten Heuvelhof, *Process Management: Why Project Management Fails in Complex Decision Making Processes*. Boston: Kluwer Academic Publishers, 2002.

[20] J. R. Gil-Garcia, I. S. Chengalur-Smith, and P. Duchessi, "Collaborative e-Government: impediments and benefits of information-sharing projects in the public sector," *European Journal of Information Systems,* vol. 16, pp. 121-133, 2007.

[21] S. S. Dawes and T. A. Pardo, "Building collaborative digital government systems," in *Advances in digital government: Technology, human factors, and policy*, W. J. McIver and A. K. Elmagarmid, Eds. Boston: Kluwer Academic Publishers, 2002, pp. 259-273.

[22] R. Briggs, G. Klofschoten, G. J. Vreede, and D. Douglas, "Defining Key Concepts for Collaboration Engineering," in *Twelfth Americas Conference on Information Systems (AMCIS)*, Acapulco, Mexico, 2006.

[23] B. Klievink and M. Janssen, "Improving Integrated Service Delivery: A Simulation Game," in *Dg.o conference 2009*, 2009.

[24] S. Meijer, *The organisation of transactions: Studying supply networks using gaming simulation*. Wageningen: Wageningen Academic, 2009.

[25] R. D. Duke, "A Paradigm for Game Design," *Simulation & Gaming,* vol. 11, pp. 364-377, 1980.

[26] R. D. Duke and J. L. A. Geurts, *Policy Games for Strategic Management*: Dutch University Press, 2004.

[27] S. Meijer and G. J. Hofstede, "Simulation games for improving the human orientation of production management," in *Current Trends in Production Management, European Series in Industrial Management*. vol. 6, G. Zulch, S. Stowasser, and H. S. Jagdev, Eds. Aachen: Shaker-Verlag, 2003, pp. 58–64.

[28] B. Klievink and M. Janssen, "Realizing joined-up government - Dynamic capabilities and stage models for transformation," *Government Information Quarterly,* vol. 26, pp. 275-284, 2009.

Appendix A

Questionnaire (from [11]), translated from Dutch.

Satisfaction process
1. I feel satisfied with the way in which today's meeting was conducted.
2. I feel good about today's meeting process.
3. I liked the way the meeting progressed today.
4. I feel satisfied with the procedures used in today's meeting.
5. I feel satisfied about the way we carried out the activities in today's meeting.

Satisfaction outcome
6. I liked the outcome of today's meeting.
7. I feel satisfied with the things we achieved in today's meeting.
8. When the meeting was over, I felt satisfied with the results.
9. Our accomplishments today give me a feeling of satisfaction.
10. I am happy with the results of today's meeting.

Commitment of resources
11. I support the goal of this meeting as it was presented in the introduction.
12. I had a stake in achieving the goal of this meeting as it was presented in the introduction.
13. I was motivated to contribute in this meeting.
14. I was willing to put my time and effort in this meeting.
15. I found this meeting important.

Efficiency
16. I found the meeting worth the time and effort.
17. The time and effort requested from me was reasonable.
18. I was able to contribute relevant knowledge & experience I had for the meeting.
19. The time and effort I spend in the meeting was what I expected
20. My input was justified.

Effectiveness
21. The result of the meeting had the quality I expected.
22. What we achieved today met my expectations.
23. We achieved what we intended.
24. The result has the quality intended.
25. The result was as I hoped

Commitment to the outcome
26. I support our achievement of today
27. I agree with the results we achieved today
28. I fully support the results we achieved today
29. I endorse the results of today
30. I commit to the results achieved today